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MONOGRAPH

ON

DYES AND DYEING

IN THE

MADRAS PRESIDENCY.

BY

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Dyes and Dyeing in the Madras Presidency.

THE following report is confined entirely to native methods of dyeing with indigenous products. It is by no means a complete account, for, I have not had the opportunity of travelling through the various districts to make personal inquiries. The time too for collecting information has been very limited. On receipt of instructions to prepare the monograph, I at once despatched urgent letters to all the Collectors asking for information regarding the methods of dyeing and the materials used. Replies were promptly sent containing valuable information; but the time left to me to compare the methods as practised in different places, and to ascertain the nature, origin and particular use of the various substances, used in dyeing, for the purpose of classification, has been barely sufficient. Fortunately, one of the carpet weaving instructors in the School of Arts happened to be a professional dyer from Ayyampéttai, where the dyeing of cotton, silk, wool and also hemp is carried on to some extent according to native methods. With the assistance of this dyer, who showed me practically all he knew, and by reference to the reports of the Madras Exhibitions of 1855 and 1857 containing descriptions of some of the materials used then, and also the reports from the Collectors, I have been placed in a position to write a fairly correct account, though short, and, as I have stated, for want of time, incomplete.

In Madras itself, and some of the other towns in the Presidency, aniline and other European preparations have almost entirely taken the place of native dyes, not that they are cheaper—as a matter of fact, they are more expensive—but because the process of applying them is simpler and quicker. The brightness of the aniline colours too takes the fancy not only of the purchasers but also of the dyers themselves, though it is generally admitted that these dyes are not as permanent as their own.

The substances used in dyeing include metals, woods, fruits, flowers, leaves, roots, barks, insects and earths. I have classified these under two heads, viz., Colouring substances and Mordants.

I.—COLOURING SUBSTANCES.

கொம்பரக்கு (*Kombu Arakku*) *Stick-lac.*—Native dyers are, for the most part, ignorant of the true origin of this substance; by some it is wrongly considered to be a pure gum; others are nearer the mark in considering it the deposit of a certain insect, but they appear to have taken no pains to find out further particulars. One dyer informed me that he once found some of the substance on the branch of a tree in Madras in a fresh condition, and on squeezing it observed that it yielded a small quantity of bright red fluid like blood. This statement confirms the conclusion arrived at by European writers, and I cannot do better here than quote *verbatim* an extract from an article copied by the *Scientific American* from *La Nature*. It is as follows:—

"The Indian lac is collected from trees of very different genera—sacred fig, banyan, jujube, acacia, croton, &c. It forms under the influence of the sting of a hemipterous insect the *Carteria lacca* or *Coccus lacca*. It is a gall insect of the cochineal kind resembling a red louse, which, at the time of oviposition, fixes itself in great numbers upon the young branches of the above-named plants. These insects secrete a resinous and waxy substance which solidifies imprisoning the insect and forms a thick crust that covers the epidermis of the branch attacked. The oviposition is effected during this transformation. The female dies and her body becomes a vesicle filled with a reddish liquid designed as food for the larvæ. Each female lays twenty eggs which become larvæ and perfect insects and escape from the resinous stratum. The collecting of the lac is done by gathering the branches upon which it is found before the transformation of the larvæ into perfect insects."

Another writer considers this resinous substance enclosing the insects to be the sap or gum which exudes from the branch attacked, and not a deposit left by the insect. This, I think, is more likely judging from the nature of the *shell-lac* obtained from it. The lac delivered to commerce is of three kinds: *stick-lac*, which is the natural product, the substance still adhering to the branches upon which it was produced; *seed-lac*, the same as the above broken into fragments and separated from the branches; and *shell-lac* which is the substance left after the colouring matter has been extracted from it as explained in the recipe for dyeing with lac. The lac yields a fine crimson dye nearly as bright as that obtained from cochineal and more permanent. The price of stick-lac varies according to quality, ranging from Rs. 6 to Rs. 8 per Madras maund of 25 seers each.

கிரிம்ஜி (*Kirimjee*).—This word is evidently a corruption of the English word crimson; it is the name given by Madras dyers throughout the Presidency to *cochineal*, which they still mistake to be a seed or grain. In the Manual of North Arcot District, Vol. II, page 162, it is stated that cochineal is imported from Hyderabad, where it is said to feed on the prickly-pear; but other and older records show that this insect is not a native of India, and that all the efforts which were made to introduce the best kind from Mexico, where they were first discovered, proved unsuccessful. For a long time, the attention of the East India Company had been directed to the rearing of these insects, and about 100 years ago, some were, with much difficulty, procured and a large quantity produced; but, unfortunately, the insects turned out to be of the wild species which are small and deficient in colouring matter. Perhaps, later efforts have proved more successful. Berthollet is of opinion that the wild cochineal improves greatly when bred on certain kinds of plants different from those on which they are found in Mexico. The substance used by dyers here corresponds with his description of the Mexican cochineal and yields a very beautiful colour; though whether this is imported from Mexico or an improved breed of the wild species introduced formerly as stated above, or whether it is really an indigenous cochineal or some other insect of the same species recently discovered, I have not had time to investigate. It is used chiefly for dyeing silk as it is very expensive, costing about Rs. 8 or 9 a viss.

நுணா (*Noona*).—There is a tree as well as a plant called *noona* by Madras dyers, the botanical names of which are *Morinda umbellata* or *Citrifolia*, and *Oldenlandia umbellata* respectively. In the reports of the Madras Exhibitions of 1855 and 1857 referred to in the preamble, it is stated that both of these are used by native dyers to produce a red dye on cotton stuffs; that is, the bark of the former called *morinda bark* and the root of the latter known as *chay root*; but the dyer whom I consulted avers that no part of the *morinda* or *noona tree* is ever used; it is the *plant* only which is used for dyeing and is extensively cultivated. The reports from the several Collectors too seem to some extent to confirm this statement by the description given of the material used for the red dye; though in most cases, the name morinda has been given as a translation of the Tamil names for chay root, viz., நுணாவேர், சிறுநுணாவேர் (small *noona* root), and simply சிறுவேர் meaning small roots. To convince myself, I obtained some bark and wood from one of the *noona* trees in the School of Arts compound, and had them boiled in water and kept soaking for nearly 24 hours, but the water remained perfectly colourless. The *noona* tree grows freely throughout the Presidency. It is a small tree which is in blossom the greater part of the year. The *noona plant*, or small *noona* as the natives call it, resembles the tree in every respect except size rarely exceeding 3 feet in height. It grows spontaneously in sandy soils and is also cultivated, but the root of the wild plant is reckoned the best; the longer and finer the root, the more colouring matter it is supposed to yield. It is dried and powdered, in which condition it resembles snuff; when mixed with water, it yields a golden yellow colour like raw sienna. The addition of a little lime or ashes of milk-hedge turns this into a fine clear red; a few drops of dilute sulphuric acid turns this again into yellow. English writers seem to have given different names to this plant, no doubt, according to the district or locality where their researches were made; the following are extracts from *one book*, viz., "The Manual of Colours and Dye Wares" by J. W. Slater:—

"*Chayavra.*—A plant of the Madder family capable of dyeing similar colours. It is abundantly used in India; but is not met with in European markets.

"*Noona.*—The root of a plant of the Madder family, used for similar purposes in India, but not met with in European markets.

"*Sooranjee.*—A plant growing in India known to botanists under the name of *Morinda citrifolia*. In its native country, it has long been employed as a dye ware yielding colours analogous to those obtained from Madder. The part employed is the root."

It is obvious from the above extracts that one and the same plant is referred to: the first named *Chayavra* is no doubt meant for *Chay root*, which is the term used in the Reports of the Madras Exhibitions of 1855 and 1857; the second, *Noona*, is evidently meant for small *noona* which I have described; and the third, *Sooranjee*, is the Telugu or Hindi name for the same plant.

பொரசம்பூ (*Porasampoo*).—Porasam flower called also *Palas* flower, the blossom of the *Butea frondosa*, a common tree thriving well in many parts of the country; the flower when fresh is of a bright yellow colour, when dry a pale orange; with alum, it yields a yellow dye which turns to orange by the addition of a little soda. On wool, the yellow dye is said to be more permanent than that obtained from *turmeric*. It is also used with turmeric to modify the greenish tinge of the latter and to give it greater permanence.

வரத்தங்கி (*Varathangi*)—In Hindustani, this is called *Patang*; in English, Sappan (*Cœsalpinia*).—The colour is obtained from the wood itself which is sold in chips convenient for use. The lighter pieces are of a dull orange colour, the darker ones more red. The decoction from sappan wood is of a pale orange colour, which by the addition of alum is turned to a deeper hue.

கபிலபொடி (*Kapila Podi*) that is, Kapila powder; "the stellate pubescence covering the 3 coccus capsules of this large tree," viz., the *Rottlera tinctoria*.—The powder is of a reddish colour, resembling pulverized terra cotta. When rubbed between the fingers or on a piece of paper, it leaves a stain of a golden tint. It does not dissolve in cold water nor in dilute sulphuric acid; but, as will be seen in the recipe for orange dye on silk, it has first to be mixed with oil into a sort of paste and then diluted in water containing lime and an alkali. The *Rottlera tinctoria* is a large tree found in many parts of the Presidency, but chiefly in Mysore. The powder falls from the capsules and is said to be collected on beds of chunam lightly strewn under the trees.

ஜாபிராவிரை (*Jabra Virai*) or seed of the *Jabra* plant (*Arnotto* or *Bixa orellana*).—This seed resembles somewhat in shape and size the seed of the *Cassia tora* called in Tamil *Tagara virai*, which is classed under mordants. The colouring matter obtained from the arnotto is deposited chiefly, if not entirely, on the outer surface of the seed, from which it is removed merely by immersion in hot water. It is used for dyeing silk of various shades of yellow and orange; but the colour is not permanent, and is not much used. The orange-coloured garments of fakirs, biragis and other religious mendicants are dyed with the colour from this seed. It is also used by milkmen to give a yellowish tinge to their butter; hence it is also known by the name of *Vennai virai* or *butter seed*. In Europe, it was much used formerly for dyeing silk and wool and was obtainable there in the form of a paste or in cakes.

அவரி (*Avari*).—The Tamil name for the indigo plant. Several pages might be written describing the cultivation, mode of preparation and extensive use throughout the world of this most important of all dye stuffs, but it is too well known to need description here. European as well as native capitalists in this country have largely cultivated the indigo plant and considerably improved the methods of extracting the pure colouring matter from it. There are several species of the plant, but the most important are *avari*, that is, indigo proper, and *pala*, which is a plant found chiefly in the Northern districts, from which a blue colour analogous to indigo is extracted; this is termed *pala* indigo. The colloquial name for indigo is *neelum*, but this refers to the colour (blue) and not to the plant from which it is obtained.

காசா இலை (*Kasa ilai*) leaves of the kasa tree, *Memecylon tinctorium*, a small tree common in jungles. The wood is brought into Madras for firewood. The leaves which are also imported in large quantities are used by dyers as an adjunct to *noona* root for bringing out the colour, in preference to alum, which injures the thread. Cold infusion of the leaves imparts a yellow dye which by itself is not permanent.

அன்ன பேதி (*Anna bedi*).—This is the Tamil name for sulphate of iron which is used for black dye for all the four materials: cotton, silk, wool and hemp. Previous to the importation of this substance, native dyers made use of pieces of rusty iron by steeping these in sour *kanjee* water. Even now this method has not altogether been abandoned, especially in the case of dyeing cotton or hemp as will be seen from the recipes given. In some villages, dyers who cannot procure or afford to purchase sulphate of iron, continue the old method of preparing the iron solution.

மஞ்சள் (*Manjal*).—This is the Tamil name for ordinary turmeric (*Curcuma longa*) which is an essential ingredient in curry and is used by native women to give colour and softness to the skin. It affords without a mordant a yellow dye which is brilliant but not permanent. For dyeing, the tubers have to be carefully selected; this is done by breaking or cutting a piece; if the fracture exhibits a rich colour, the root will yield a good dye, but if it has a dry look, it is almost useless for this purpose. Madras turmeric is considered to be of a superior quality to that obtained from the other Presidencies.

செம்புராம்பட்டை (*Semburam pattai*)—*The bark of the Semburam tree—Ventilago Madrasapatana*.—It is used as an alterative or adjunct in dyeing with *noona* root to modify the colour of the latter. In Madras formerly and at present in all towns in the Presidency where aniline dyes have not yet found their way to vitiate or to raise—a matter of opinion—the taste of the people, the *noona* root dye by itself is considered crude and therefore not permanent; though as a matter of fact which dyers keep to themselves, the extract from the *semburam* bark used in the last operation in dyeing cotton red, has no permanent effect on the colour produced by the *noona* root which is a really fast dye. After a few washings, the toning matter entirely disappears, leaving the stuff just the same as another piece without this toning would be after the same number of washings. The good taste of the purchaser, however, has to be satisfied. Different names are given in the reports from the different districts to the bark which is used with *noona* root, but I think that the same tree is referred to; the report of the Madras Exhibition of 1857 confirms this opinion. The other names are *shudak pattai*, *surool pattai*, *papli chakka* and *vembadam pattai*.

குசும்பா (*Kusumba*)—*This is the Tamil name for safflower, the flower of the Carthamus tinctorius*.—The tree is extensively cultivated in the northern districts, the seed yielding an oil and the flower two colouring matters, a yellow which is worthless and a red which is very fine; the flower is gathered and rubbed down into a powder and sold in this state. When used for dyeing, it is put in a cloth and washed in cold water for a long time to remove the yellow colouring matter; it is then boiled and yields the pink dye which however is not a permanent one.

சிவப்புசந்தனம் (*Sevapoosandanam*)—*Red sandal wood or sanders wood.*—This dye-wood is the produce of a large tree *Pterocarpus santalinus* growing principally on the Eastern Coast in Pulicat and the Tirupati mountains. It is generally sold in billets of two or three feet in length and is of a deep red colour which is not easily extracted from it. Native dyers do not use it much as they do not consider it permanent; it is chiefly exported to Europe where, by the use of certain chemicals, permanent browns for dyeing wool are obtained from it.

II.—MORDANTS.

The name "mordant" is given to those substances used in dyeing which possess little or no colouring matter in themselves, but which serve to connect the colouring parts to the stuffs that are dyed and fix them there. Few colours have the power to attach themselves alone to either cotton, silk or wool. As a rule, when applied in this manner, they produce merely a faint and fugitive stain not worth calling a dye; and even those few colours which are capable of adhering to the fibre alone are generally rendered both brighter and more permanent by the intervention of a mordant as in the case of dyeing with turmeric or cochineal. This combining agent is generally an astringent, the Tamil equivalent for which is காரம் pronounced *kharum.* The mordant is sometimes mixed with the dye; sometimes the stuff is impregnated with it previous to being exposed to the dyeing bath; and on other occasions both these methods are combined as in the case of dyeing with lac. The following are some of the substances most generally employed as mordants by native dyers in the Madras Presidency :—

அப்பளாகாரம் (*Aplakharum*).—This is the colloquial name in Madras for the alkaline earth used by all dhobies instead of soap for cleansing clothes. The other names are சவுட்டுமண் and வழூமண். With dyers, it is an indispensible article being used by them not only for scouring material previous to dyeing, but also as a mordant to mix with the dye. It can be obtained in large quantities throughout Southern India, being found as a "yellowish gray sandy efflorosence which covers miles of country where decayed white granite forms the surface soil; the earth contains from 13 to 25 per cent. of crude carbonate of soda and begins to accumulate in the dry weather immediately after the rains; it can be scraped off the surface to a depth of two or three inches." This substance is collected, boiled with a little quicklime and then formed into blocks for the market.

படிகாரம் (*Padikharam*)—*This is the Tamil name for alum.*—Native dyers do not employ it as a mordant to such an extent as European dyers with whom for many years it was considered the safest and best of mordants. The reason for the spare use of this substance by native dyers is manifestly two: firstly, it is far more expensive than *aplakharam* (dhobies' earth), and secondly, it cannot always be obtained quite pure, very often containing iron (in the state of sulphate of protoxide or of insoluble peroxide) which not only tends to dull the brilliancy of the dye, but eventually injures the fibre. It is, however, being more largely used now than formerly.

தகரைவிரை (*Tagarai virai*), *the seed of the Tagarai plant, Cassia tora*, a shrub with small oval leaves.—The blossom is a small yellow flower of four petals out of the centre of which grows a thin long bean containing the seeds which, owing to their close proximity to each other, assume the form of irregular cylinders. The dry seeds are of a greenish brown. When boiled, they swell and form into a glutinous mass which is added to the indigo bath. The starchy quality of this affords a temporary connection between the colouring parts and the fibre, while the lime (chunam) which is also added acts as the fixing agent.

சுண்ணும்பு (*Chunam*).—Ordinary lime made from burnt shells. It is sparingly used.

கடுக்காய் (*Kadukkai*)—*Myrabolans* or *Indian gall-nuts.*—They are oval and of a dingy yellow colour and contain much tannin: hence they are useful to the tanner as well as the dyer. With alum, a good yellow dye is obtained and with salts of iron, a black colour little inferior to that produced by the oak-gall which is not a fruit but an excrescence found on the young branches of the oak produced by the puncture of an insect; the juice exudes from the wound and forms a shelter for the eggs laid in it by the insect. The myrabolan on the other hand is the fruit of a very large tree known as *Terminalia chebula.* It has been used as a material for dyeing and tanning in this country from time immemorial. It has also been introduced into English commerce and has been found so useful that several thousands of tons of it are annually consumed in England.

பிஸ்தா (*Pista*).—This is not a Tamil word, but is the only name by which the substance referred to is known amongst native dyers in Madras, who for the most part are not able to explain its origin. Some consider it to be the undeveloped flower or bud of the *kadukkai* or myrabolan tree (*Terminalia chebula*); but this is a mistake, for the substance which in form resembles a small poppy head is a mere hollow shell. Presumably, it is the excrescence formed on the leaf of this tree by the puncture of an insect as in the case of oak galls; such excrescence is said to be formed and if the substance referred to is the same, it is a true gall. By native dyers, it is used only in connection with cochineal.

ஆட்டுச்சாணி (*Attu chani*), *Sheep's dung*.—This has been used by native dyers from time immemorial, and not long ago and probably still by European dyers also, to prepare the cotton for red dye. By the former, for dyeing with *noona* root and by the latter, for the well known Turkey red.

நல்லெண்ணெய் (*Nal yennai*).—Is the oil known as gingelly oil, or sesamum oil, the extract from the black variety seed of the *sesamum orientale*. It is extensively cultivated throughout the Presidency and is consumed to a greater extent by the natives than any other oil; for cookery, for anointing the person, for making soap and for burning in lamps. In the process of dyeing, it is used sparingly, sometimes to prepare the stuff for the dyeing bath and sometimes to effect a temporary connection between the colouring matter and the fibre, another substance rendering the combination thus effected a permanent one.

கொடிகள்ளி (Milk-hedge); கொட்டைமுத்து (castor seeds); and முள்ளுதண்டு (a wild thorny plant as the name signifies) are burnt and the ashes of either of them used with sheep's dung to prepare the cotton thread for red dye.

The above are the most important substances used as mordants and of which I have been able to procure some information. Besides these, other mordants are also used such as lime juice, soda, and marking nuts, the fruit of the *Semecarpus anacardium*.

III. PROCESS OF DYEING.

Time does not permit of my giving a statement comparing the different methods of dyeing the same material of the same colour in different localities. The following are those which were carried out in my presence and which, in most cases, agree with the methods described in the reports from the Collectors of the various districts. The processes for the different stuffs—cotton, silk, wool and hemp—are treated under separate heads. Of these, cotton dyeing is by far the oldest and the most extensively carried on in all parts of the Presidency; in fact it may be safely said that the art originated in India. Silk and wool are not much used by the natives, the one on account of its costliness, the other on account of its unsuitability for the climate. In Madras, the latter is used chiefly for coarse blankets, rugs and carpets. Hemp is used for mats and coarse canvas. In every case, the yarn is generally dyed first and then woven into cloth.

Dyeing of Cotton.

Red.—The chief colouring substance in this dye is the *noona* root; the *kasa* leaves, which are also used, are for modifying the magenta tint produced by the former alone. The other substances used are sheep's dung, ashes of milk-hedge, gingelly oil, and *semburam puttai*, that is, the bark of the *Ventilago Madraspatana*. The operation is commenced by preparing the cotton thread for the dyeing bath in the following manner; for a viss of white cotton twist, take—

Ashes of milk-hedge ...	5 measures.
Gingelly oil ...	1 viss.
Sheep's dung ...	2 pollums.

Mix the above well together in a sufficient quantity of spring water as much as would cover the twist. Let this mixture stand for some hours, then pour off the clear liquid and steep the twist in this, pressing and squeezing it well with the hands to effect thorough absorption; then leave it to soak; next day, take it out and dry it in the sun. Repeat this process of steeping the twist and drying it eight times, on each occasion preparing the liquid as stated above, the sediment left the first day being used together with fresh additions of the substances named, chiefly the ashes of milk-hedge and the oil, and every time only the clear liquid being used. In clear weather, this process of steeping and drying cannot be effected more than twice a day, so that the complete preparation of the twist takes at least four days. After the eighth operation, wash the twist well in clear water and proceed to prepare the dyeing bath as follows:—

Take powdered *noona* root, one-eighth viss, and mix with water in a large flat vessel, steep the twist in this mixture and leave it to soak for some time; then take out and dry in the sun. Repeat this process of steeping and drying ten times, after which the twist should be boiled in the same liquid together with a certain quantity of *kasa* leaves (*Memecylon tinctorium*). The final operation consists in boiling the twist with powdered bark of the *semburam* tree (*Ventilago Madraspatana*). The colour thus obtained is by no means so bright as Turkey red, but it is a fine deep rich colour like that of dark red sealing wax.

Yellow.—The old method of producing this colour on cotton was by simply steeping the twist into a decoction of turmeric and sour *kanjee* water, but this has of late been considerably improved upon. Besides turmeric, which is the chief colouring matter, the flower of the *Butea frondosa* (*porassum poo*), *kasa* leaves, and myrabolans are also

now used, all three of these yielding a yellow dye; the last-named acts also as a combining agent, alum being the principal mordant used in the process.

For a viss of cotton thread to be dyed yellow, commence by boiling the twist with one viss of broken myrabolans in a sufficient quantity of water; while this is going on, take half a viss of turmeric, one viss of *porassum poo*, half a viss of dried *kasa* leaves and a quarter viss of alum. Powder each of these, mix and lifting up the twist out of the vessel on the fire, put them into the boiling myrabolan solution; replace the twist and boil after that for two hours. If the water has evaporated and become insufficient to cover the thread properly, more water may be added. The thread should be lifted out of this ebulition now and then to see if it has acquired the desired shade. When this has been accomplished, it only remains to wash the material thoroughly and dry it in the sun. A fairly good yellow is obtained by the above process, but the colour is not permanent.

Orange.—The colour referred to here is not the beautiful rich flame or orange tint obtained on silk with *kapla* powder (*Rottlera tinctoria*), but a dull yellowish red, which is obtained by first dyeing the twist yellow as explained above and then boiling it in a decoction from sappan wood which is prepared in the following manner:—For a viss of cotton, one viss of sappan wood chips is reduced to a powder, mixed with a sufficient quantity of water and allowed to stand for twenty-four hours; the mixture is then boiled and strained and when cool, one pollum of alum is added to it; this causes a precipitation of useless matter leaving a clear liquid of a deep orange colour which is carefully poured off and in which, as stated above, the yellow twist is boiled. Some dyers merely soak the yellow dyed twist in a cold decoction of safflower (*Carthamas tinctorius*) in order to produce the orange colour. By the latter method, a brighter hue is produced than by the former and a still brighter colour by the use of arnotto seeds. The process for dyeing with which is as follows:—A quantity of arnotto seeds is tied in a piece of cloth and soaked in water for twelve hours, the colouring matter is then squeezed out in a basin of fresh water and cocoanut water, lime juice and alum added. The yarn is steeped into this mixture and boiled for an hour.

Blue.—Indigo is the only blue colouring substance known to the natives; and as the lighter shades of the colour produced by this are not permanent in the case of cotton, it is used chiefly for dyeing blue-black, which is obtained by strengthening the bath with indigo and using *aplakharam* (dhobies' earth) and a few other substances, besides those used for producing a pure blue, viz., chunam and seeds of the *thagarai* plant (*Cassia tora*). The number of operations too is multiplied according to the strength needed. Sometimes several baths are prepared varying in strength and also as regards the ingredients added to each as mordants or alteratives, and the stuff is exposed to each one in turn being dried after each immersion; sometimes the stuff is washed previous to each immersion. The indigo bath is always used cold for cotton, silk and wool. The two sorts of indigo alluded to under section I, colouring substances, viz., *avari* and *pala*, are both used for dyeing blue-black; the first, that is, indigo proper, being superior.

Green.—This colour is produced by merely steeping blue cotton twist into the yellow bath described above. The process is as follows:—

For one viss of cotton twist, take—

Indigo	2 pollums.	Chunam	2 pollums.
Boiled *thagarai* seeds (*Cassia tora*).	4 „	Water	12 measures.

Mix the above and steep the thread for a few hours, the length of time depending on the strength required—the bluer the stuff at this stage, the darker will be the shade of green eventually. Next steep the twist in the yellow bath; but it is always best to allow the blue twist to be well dried and exposed for a few days before the final operation.

Black.—The principal colouring substance in this dye is iron; the mordant is myrabolan. For a viss of cotton twist to be dyed black, commence by steeping rusty iron pieces in a sufficient quantity of sour *kanjee* water for at least three days; drain off the iron solution thus obtained and to it add a viss of broken myrabolans; then put in the twist and heat gently for about fifteen minutes, or till the liquid begins to boil. At this stage, lift up the thread and add a viss of sulphate of iron (*annabedi*) to the boiling mixture; replace the twist and again boil for an hour or two. A fine black will have been obtained by this; complete the process by washing the twist well in clear water.

Purple.—There are different shades of this colour, some almost black, but none very bright. The following is one method for obtaining a dark purple:—The yarn is first dyed red with *noona* root as described above and then steeped in an indigo solution; another method is to mix broken myrabolans, alum, jaggery and powdered *noona* root in water and allow the mixture to remain in a closed vessel for a month, after which it is used for dyeing. A lighter shade of purple is obtained by first preparing the thread as for red dye; then soaking it in a decoction of *surool pattai*

or *semburam pattai* (*i.e.*, bark of the *Ventilago Madraspatana*) for five days morning and evening, drying it after each immersion and finally boiling it in the solution.

Pink or rose colour.—The *kusumba* or safflower (*Carthamus tinctorius*) is used for this. The dried flowers are pounded and washed with water, then a solution of *aplakharam* (dhobies' earth) in water is added well mixed and the clear liquid drained off and lime juice added to it. Bleached yarn soaked in this is dyed a fine rose colour.

The colours given above are all produced with indigenous substances—sulphate of iron and alum excepted—and by methods that have been practiced for centuries past. Of these, indigo and the *noona* root are by far the most permanent dyes, the permanency of the others depending entirely on the mode of preparation and the mordants used. And as these last differ in various localities, so does the quality of the dye which is produced in different places with the same colouring substance.

Brown has not been mentioned as there is no particular name in the vernacular for this tertiary colour; it is classed as a modified red or purple. There are various shades of brown produced with the same materials as those used for red dyes.

Dyeing of silk.

Silk is not indigenous to Madras. It is imported chiefly from Bengal in a raw condition called kora which is a Hindustani word meaning unbleached; this is sold in skeins. It is of a dull yellowish tint and very coarse resembling hemp or horse hair; a whiter sort is also imported from China, *viâ* Bombay and is known as Bombay silk. Both kinds of silk seem to have been steeped in some kind of size or starch either to add to the weight or to preserve the fibre. Before dyeing, therefore, the silk has to be bleached and this cannot be effected with the skeins as they are imported for the following reason:—When the silk is first unwound from the cocoon, a single fibre is taken or at most two from two separate cocoons and reeled round a spindle; this is then made up into skeins. If these were to be bleached in this condition, the single or double fibre or strand would be liable to snap frequently when unwound for weaving purposes. Four or more such fibres from different skeins are therefore taken and wound together into one skein; this operation is termed "*Thadah*" in Tamil. For carpet-weaving, this is essential, as a good stout thread is required for the pile comprising six or more fibres. The bleaching of *kora* silk is effected by boiling the material with one-fifth of its weight of *aplakharam* in water, care being taken to regulate the heat, excess of which would completely destroy the silk, reducing it to a pulp. A portion of the silk is lifted out frequently and tested by rubbing between the fingers directly it has assumed the condition of prepared silk as sold to consumers; that is, when it is no longer tough and slippery, it should be taken out of the ebulition and washed well in clear cold water. After this operation, the silk assumes a silvery white appearance and is ready for dyeing or weaving. Silk being an animal substance is like wool, far better suited than cotton for receiving and permanently retaining the colouring particles which may be either vegetable, metallic or animal.

Bright red or crimson.—For this, cochineal is used as the colouring substance. The mordants are alum and *pista* which is presumably the excrescence or gall found on the leaves of the myrabolan tree. To dye a viss of bleached silk, first prepare the material by soaking it for a day in alum solution containing one-eighth viss of alum. Then take quarter viss of cochineal and one-eighth viss of *pista*; grind the former dry and the latter into a fine paste with a little water. Dissolve the two together in a sufficient quantity of water and heat the mixture till it begins to boil; then put in the alumed silk and continue the boiling for two hours. While this is going on, take the same quantities of powdered cochineal and ground *pista* as stated above and mix with a smaller quantity of water than was first used. Take out the silk and wash it well; add the fresh decoction of cochineal to the boiling solution and replace the silk; cover the vessel and boil again for one hour. Lastly, wash the silk in clear water. The reason for using small quantities of the cochineal twice instead of the full quantity at once is to ensure evenness of colour on the stuff.

Dark red.—For this, stick-lac is used from which the colour is extracted by soaking the substance in hot water as will be seen from the following description:—To dye a viss of bleached silk, two visses of stick-lac are required; the sticks are removed and the lac broken into small pieces, but not powdered fine; this is then tied in a coarse piece of cloth and steeped in a basin of hot water and occasionally bruised with a wooden mallet and shaken about; the liquid, which is of a fine deep red by this, is put into another vessel and more hot water poured on to the lac and the operation repeated five or six times till the lac ceases to yield any more colour. A small quantity of tamarind pulp and powdered alum are added to this liquor; the silk is put into it and boiled for three or four hours and then washed. Some dyers omit the alum in the dyeing bath, but prepare the silk previously by soaking it in a solution of alum as in the case of cochineal dye. A little turmeric powder is also used by some dyers in the alum bath to modify the somewhat magenta tinge of this colour. The lac out of which the colour has been extracted is called shell-lac.

Deep yellow and orange.—The latter is merely a deeper shade of the former, which is effected by keeping the silk longer in the dyeing bath. The prolonged exposure tends to turn the yellow more and more into red as is the case with many other vegetable dyes. For the above colours, the *kapila* powder (pollen of the *Rottlera tinctoria*) is used. Bleached silk is not required for this but the *kora* which is prepared in the following manner :—For a viss of raw silk, a decoction is made with a viss of *aplakharam* (dhobies' earth) and a little chunam dissolved in a sufficient quantity of water to cover the silk ; when the coarse particles have settled at the bottom, the clear liquid is drained off and boiled. Into this, the silk is immersed and well shaken about with a stick, then taken out and allowed to dry without being washed. This process does not bleach the silk entirely, but renders it soft and free from dirt and starch. The dye bath is then prepared by first mixing half a viss of *kapila* powder with a little gingelly oil and alum into a thick paste resembling putty ; this is afterwards dissolved in a solution previously prepared of one viss of *aplakharam* boiled in the required quantity of water. A beautiful orange coloured liquor is thus obtained, into which the prepared silk is steeped and kept soaking ; for a few hours if a deep yellow is required, and for a whole night if a deep orange is desired. Longer exposure than the last produces no different result as the silk ceases to imbibe colouring matter after a certain length of time, when the bath is prepared as above. But it seems likely that a still deeper colour approaching *scarlet* might be obtained by the use of other mordants.

Blue and Green.—The process here is precisely the same as that given for dyeing cotton of these colours. For blue, indigo is used and for green, the blue silk is steeped in the turmeric bath. This substance (turmeric) is not used by itself for dyeing silk yellow as it is not permanent on silk.

Black.—This colour too is produced on silk with the same materials and by the same process as black on cotton. The only point of importance to be noted here is that the raw silk is used without any sort of preparation previous to being exposed to the dyeing bath, which is prepared with solution of iron and myrabolans.

The above are the only colours produced on silk with indigenous products and according to native methods. The three primary colours have been noticed, of which the red from cochineal is the purest. The two secondary colours (orange and green) are both beautiful. Purple is wanting and so is the tertiary colour, brown, which is so much valued by Europeans. I have no doubt that brown can be obtained with some of the substances used for cotton dyeing, and that it has been produced, but it is not generally used by silk weavers.

Dyeing of wool.

Wool is obtained in various parts of the Presidency where sheep are plentiful ; but the best quality obtained in the market comes from the Mysore State. There are two kinds sold called " *live wool* " and " *dead wool.*" The former is taken from the living animal when shorn periodically, and the latter from the skin of the slaughtered or dead animal. The two are distinguished chiefly by a strong and somewhat offensive smell which is invariably present in the " dead wool. " There is a further distinction as regards colour—white, fawn, dark, gray and black being the natural colours ; of these, the white wool is the most expensive ; fawn and gray the most plentiful ; black wool is very rare. Of all the articles of manufacture for which wool is used, carpets are the most common, and it is chiefly for this purpose that wool is dyed. Carpets are manufactured in Nellore, Ayyampéttai, Bangalore, Madras, Vellore and a few other places. The best carpets are as a rule manufactured in Government Penitentiaries by the long-term prisoners who become perfect adepts in the art from constant practice. Besides, in such institutions, the very best of material and apparatus are provided. Native carpet weavers are generally poor ; they cannot afford spacious and properly lighted workshops, nor highly skilled assistants ; they employ boys, chiefly their own children. In Bangalore and Madras, native dyers use aniline dyes for wool just as they do now for silk and cotton. In Nellore and Ayyampéttai, pure native dyes and methods are still adhered to. The substances used for dyeing are in most cases precisely the same as those used for silk, both materials being animal productions. For blue of various shades, indigo is used ; for red and pink, stick-lac ; for black, sulphate of iron ; and for green, indigo, turmeric and the *porasam* or *palas* flower (*Butea frondosa*). The processes for the above being also the same as in the case of silk dyeing, it is needless to recapitulate them here. For yellow and orange, however, the *kapila* powder is not used as in the case of silk ; these colours are produced in wool with turmeric and *porasam* flower. A larger quantity of *porasam* flower than is required for yellow and a subsequent immersion in *aplakharam* solution produces the orange colour. Cochineal also is not used for dyeing wool as it is a very expensive substance. Lac supplies its place. The natural fawn and gray referred to above therefore supply two colours more to the woollen carpet weaver than the silk weaver has amongst his limited number.

Hemp, flax, &c., being vegetable substances, are dyed with the same materials and in the same manner as cotton.

The following list which has been prepared from reports sent by the several Collectors shows the number of towns or villages in each district where dyeing of cotton, silk and wool are carried on according to native methods.

Districts.	Cotton dyeing.	Silk dyeing.	Wool dyeing.	—
Vizagapatam	26	1	...	There are few special dyers of wool. Carpet weavers generally dye their own material, or have it dyed by cotton or silk dyers. Reports from four districts have not yet been received. In two districts, viz., Nilgiris and Madras, dyeing is not carried on according to native methods.
Kurnool	8	7	1	
Anantapur	43	3	...	
Cuddapah	36	5	...	
Nellore	36	...	...	
Chingleput	18	1	...	
Bellary	52	80	...	
North Arcot	44	15	1	
South Arcot	67	...	...	
Salem	36	14	...	
Coimbatore	30	2	...	
Tanjore	30	9	1	
Trichinopoly	22	1	...	
Madura	26	2	...	
Malabar	2	...	...	
South Canara	1	...	...	

SCHOOL OF ARTS,
Madras, 28*th February* 1896.

(Signed) EDWIN HOLDER,
Acting Superintendent.